CLAIMS

1. A mesostructured material comprising a mineral phase within which are dispersed particles of nanometric dimensions comprising at least one metal oxide in the crystalline state selected from a cerium oxide, a zirconium oxide, a titanium oxide and an oxide of a rare earth other than cerium, said oxide comprising at least one metallic element M in the cationic form, in solid solution within the crystalline lattice of said oxide.

2. A material according to claim 1, characterized in that it is thermally stable.

3. A material according to claim 1 or claim 2, characterized in that at least at a local level, it has one or more mesostructures selected from mesoporous mesostructures with three-dimensional hexagonal P63/mmc symmetry, with two-dimensional hexagonal symmetry, with three-dimensional cubic Ia3d, Im3m or Pn3m symmetry; from vesicular or lamellar type mesostructures, or from vermicular type mesostructures.

4. A material according to any one of claims 1 to 3, characterized in that said particles with nanometric dimensions are particles with a spherical or isotropic morphology at least 50% of the population of which has a mean diameter in the range 1 to 10 nm, or highly anisotropic rod type particles at least 50% of the population of which has a mean transverse diameter in the range 1 to 10 nm and a mean length that does not exceed 100 nm.

5. A material according to any one of claims 1 to 4, characterized in that the metal oxide present within said particles with nanometric dimensions has a degree of crystallinity of 30% to 100% by volume.

6. A material according to any one of claims 1 to 5, characterized in that the quantity of cations of element M in solid solution (or, if appropriate, of the totality of the solid

cations present in the oxide.

7. A material according to any one of claims 1 to 6, characterized in that said particles with nanometric dimensions are particles based on cerium oxide, and in that said element M is selected from rare earths other than cerium, transition metals that are capable of being integrated in the cationic form in solid solution into a cerium oxide, and alkaline-earth metals.

8. A material according to any one of claims 1 to 6, characterized in that said particles with nanometric dimensions are particles based on zirconium oxide, and in that said element M is selected from rare earths, transition metals that are capable of being integrated in the cationic form in solid solution into a zirconium oxide, and alkaline-earth metals.

9. A material according to any one of claims 1 to 6, characterized in that said particles with nanometric dimensions are particles based on titanium oxide, and in that said element M is selected from rare earths, transition metals that are capable of being integrated in the cationic form in solid solution into a titanium oxide, and alkaline-earth metals.

10. A material according to any one of claims 1 to 6, characterized in that said particles with nanometric dimensions are particles based on an oxide of a rare earth other than cerium, and in that said element M is selected from rare earths other than the rare earth constituting said oxide, transition metals that are capable of being integrated in the cationic form in solid solution into a rare earth oxide, and alkaline-earth metals.

11. A material according to any one of claims 1 to 10, characterized in that said mineral phase is at least partially constituted by silica.

12. A material according to any one of claims 1 to 11, characterized in that the mineral phase also comprises metallic cations of metal M and/or clusters based on metal M dispersed within said mineral phase and/or on the surface of said mineral phase.

13. A material according to any one of claims 1 to 12, characterized in that at least a portion of the particles with nanometric dimensions dispersed within the mineral binder phase is in contact with porous portions constituting the internal space of the material.

14. A material according to any one of claims 1 to 12, characterized in that the (mineral binder phase/particles with nanometric dimensions) molar ratio is in the range 20:80 to 99.5: 0.5.

15. A material according to any one of claims 1 to 14, characterized in that it comprises crystallites based on the oxide, hydroxide, oxyhydroxide, carbonate or hydroxycarbonate of said element M.

16. An ordered mesoporous or mesostructured material according to any one of claims 1 to 15, characterized in that said material has a BET specific surface area in the range 750 to 2300 m^2 per cm^3 of material.

17. A process for preparing a material according to any one of claims 1 to 16, characterized in that it comprises successive steps consisting in:

a) producing a mineral mesostructure integrating, within its walls, particles with nanometric dimensions comprising a metal oxide in its crystalline state selected from a cerium oxide, a zirconium oxide, a titanium oxide and a rare earth oxide other than cerium;

b) introducing into the mesoporous structure obtained, a compound based on said element M, the total amount of element M introduced into the structure with respect to the total surface area developed by the mesostructure being less than 5 micromoles of cation per m^2 of surface; and

c) subjecting the mesostructure produced to a temperature of at least 300°C and not higher than 1000°C.

18. A preparation process according to claim 17, characterized in that step a) is implemented by carrying out the following steps:

a1) forming an initial medium comprising a templating agent, namely a surfactant type amphiphilic compound which can form micelles in the reaction medium;

a2) adding to the medium of step a1) a colloidal dispersion of particles with nanometric dimensions based on a metal oxide in the crystalline state, selected from cerium oxide, a zirconium oxide, a titanium oxide and a rare earth oxide other than cerium;

a3) forming a mesostructured mineral phase, usually at least partially, or even essentially constituted by silica, said mineral phase by adding a mineral precursor to the medium; and

a4) eliminating the templating agent, in particular by heat treatment or by entrainment by a solvent.

19. A preparation process according to claim 17 or claim 18, characterized in that step b) is carried out by immersing the mesostructured material obtained at the end of step a) in a solution comprising the element M in a concentration in the range 0.1 to 1.5 mol/l then filtering the medium obtained.

20. A preparation process according to claim 17 or claim 18, characterized in that step b) is carried out by immersing the mesostructured material obtained at the end of step a) in an aqueous or hydro-alcoholic solution comprising cations of metal M in a concentration in the range 0.2 to 1.5 mol/l then centrifuging the medium obtained at a rate of 2000 to 5000 rpm, for a period not exceeding 30 minutes.

21. A preparation process according to any one of claims 17 to 20, characterized in that, following the impregnation/heat treatment procedures of steps b) and c), it comprises

one or more subsequent impregnation/heat treatment cycles implementing steps of type b) and c) carried out on the solid obtained from the preceding cycle.

22. Use of a material according to any one of claims 1 to 16 or of a material that can be obtained by the process of any one of claims 17 to 21, as a heterogeneous acidic, basic or redox catalyst.

23. Use of a material according to any one of claims 1 to 16 or of a material that can be obtained by a process according to any one of claims 17 to 21, in which said material comprises particles of cerium oxide integrating manganese in solid solution within the walls of its mesostructure, as a catalyst for absorption of oxides of nitrogen.

24. Use of a material according to any one of claims 1 to 16 or of a material that can be obtained by a process according to any one of claims 17 to 21, as a support for catalytic species.

25. A catalyst that can be obtained by supporting catalytic species on a material according to any one of claims 1 to 16 or of a material that can be obtained by a process according to any one of claims 17 to 21.